Cross-sectional study of paediatric case mix presenting to an emergency centre in Cape Town, South Africa, during COVID-19

by

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Research assignment presented in partial fulfilment of the requirements
for the degree Master of Medicine in Emergency Medicine
in the Faculty of Medicine and Health Sciences at Stellenbosch University

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December 2021

DECLARATION

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December 2021

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(As published in BMJ Paediatrics Open)

BMJ Paediatrics Open

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To cite: Akuaake LM, Hendrikse C, Spittal G, *et al*. Cross-sectional study of paediatric case mix presenting to an emergency centre in Cape Town, South Africa, during COVID-19. *BMJ Paediatrics Open* 2020;**4**:e000801. doi:10.1136/bmjpo-2020-000801

► Additional material is published online only. To view, please visit the journal online (http://dx.doi.org/10.1136/bmjpo-2020-000801).

Received 14 July 2020
Revised 8 September 2020
Accepted 9 September 2020

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ABSTRACT

Objective To describe and compare the effect of level 5 lockdown measures on the workload and case mix of paediatric patients presenting to a district-level emergency centre in Cape Town, South Africa.

Methods Paediatric patients (<13 years) presenting to Mitchells Plain Hospital were included. The level 5 lockdown period (27 March 2020–30 April 2020) was compared with similar 5-week periods immediately before (21 February 2020–26 March 2020) and after the lockdown (1 May 2020–4 June 2020), and to similar time periods during 2018 and 2019. Patient demographics, characteristics, International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10) diagnosis, disposition and process times were collected from an electronic patient tracking and registration database. The χ^2 test and the independent samples median test were used for comparisons.

Results Emergency centre visits during the lockdown period (n=592) decreased by 58% compared with 2019 (n=1413) and by 56% compared with the 2020 prelockdown period (n=1342). The proportion of under 1 year olds increased by 10.4% (p<0.001), with a 7.4% increase in self-referrals (p<0.001) and a 6.9% reduction in referrals from clinics (p<0.001). Proportionally more children were referred to inpatient disciplines (5.6%, p=0.001) and to a higher level of care (3.9%, p=0.004). Significant reductions occurred in respiratory diseases (66.9%, p<0.001), injuries (36.1%, p<0.001) and infectious diseases (34.1%, p<0.001). All process times were significantly different between the various study periods.

Conclusion Significantly less children presented to the emergency centre since the implementation of the COVID-19 lockdown, with marked reductions in respiratory and infectious-related diseases and in injuries.

What is known about the subject?

- The volume of children attending emergency centres varied during previous epidemics.
- Paediatric emergency centre attendances decreased during COVID-19.

What this study adds?

- Significantly less children presented to the emergency centre since the implementation of national COVID-19 level 5 lockdown.
- A greater proportion but smaller numbers of younger and sicker children attended the emergency centre during the COVID-19 lockdown.
- Marked reductions occurred in respiratory diseases, infectious-related diseases and in injuries.
- The proportion of infectious diseases increased in patients <1 year, while injuries increased in older children.

INTRODUCTION

Paediatric emergency care decreases childhood morbidity and mortality, but an epidemic has the potential to disrupt access to care and essential child health services.[1–3]

COVID-19 was declared a global pandemic by the WHO on 11 March 2020 and is caused by SARS-CoV-2.[4] The pandemic resulted in most countries implementing social distancing measures to curb the spread of the disease. The South African government implemented a national lockdown on 27 March 2020, consisting of five levels.[5] Level 5 is the most restrictive with only essential services permitted to operate and strict limitations on public transport services with regards to capacity and operating times. The sale of alcohol and tobacco is prohibited as well as any form of exercise in public spaces. Lower levels are a stepwise easing of the restrictions imposed on level 5 in varying degrees to attempt to limit community transmission and resurgence of the virus, while allowing for economic recovery. Level 1 allows for near normal activity to resume but with the recommended public health guidelines to be followed at all times, including wearing a facemask, maintaining social distancing of at least 2 m and frequently washing or sanitising

hands. The South African lockdown started at level 5, which lasted 5 weeks (27 March–30 April 2020) and was followed by level 4 (1 May–31 May 2020). Level 3 restrictions were implemented on 1 June 2020 and was still in place at the time of data collection.

The implemented lockdown measures under level 5 resulted in all non-urgent healthcare appointments being cancelled, including the de-escalation of services at community healthcare centres and the rescheduling of elective surgeries and outpatient department visits at hospital level. An upsurge in patients visiting the emergency centre was anticipated as most other healthcare services were de-escalated. Furthermore, the pandemic and subsequent lockdown periods coincided with autumn and the beginning of winter where an increase in respiratory-related cases are typically experienced, especially in the paediatric population. However, the effect of the closing of early childhood development centres and schools, as well as most parents forced to work from home, are unknown but could also change the number and type of presentations to the emergency centre.

Previous studies presented conflicting results of healthcare utilisation during an epidemic. An increase in paediatric patients presenting to emergency centres was seen during the swine influenza (H1N1pdm09 virus) pandemic in 2009.[6–8] However, paediatric-related presentations decreased by up to 40% during the 2015 Middle East respiratory syndrome (MERS) epidemic in Korea.[9 10] A more pronounced decrease (80%) was witnessed during the 2003 severe acute respiratory syndrome (SARS) epidemic in Taiwan.[11] A decline in trauma cases presenting to emergency centres across South Africa has already been noticed,[12] but the effect of the national lockdown on paediatric presentations remains unclear. The aim of the study was to describe and compare the effect of the level 5 national COVID-19 lockdown measures on the workload and case mix of paediatric patients presenting to a district-level emergency centre in Cape Town, South Africa.

METHODS

Study design

A descriptive analysis was conducted on existing data. Data were extracted from an existing database that collects routine data prospectively (in real time).

Study setting

Mitchells Plain Hospital is a 365-bed hospital providing district hospital health services to the surrounding community. It serves a low-income to middle-income health district of approximately 600 000 people.[13 14] The health district has many social challenges, including gangsterism, crime and drug abuse. Interpersonal violence and other injuries are particularly prevalent during weekends.[15] Mitchells Plain Hospital is situated on the outskirts of Cape Town and has an emergency centre that manages around 4100 patients per month; 950 being children under the age of 13 years. A quarter of the children are deemed very urgent or emergent at presentation (orange or red according to the South African Triage Scale (SATS)),[16] and an average of 135 are admitted to the inpatient paediatric service. Monthly paediatric presentations increase to around 1 200 during the annual respiratory surge season (March–June), of which about 190 are admitted. Normally, the paediatric department assists with providing staff for the emergency centre, and non-specialist physicians from the paediatric department have been the treating clinician for around 40% of acute paediatric presentations. Since the lockdown measures

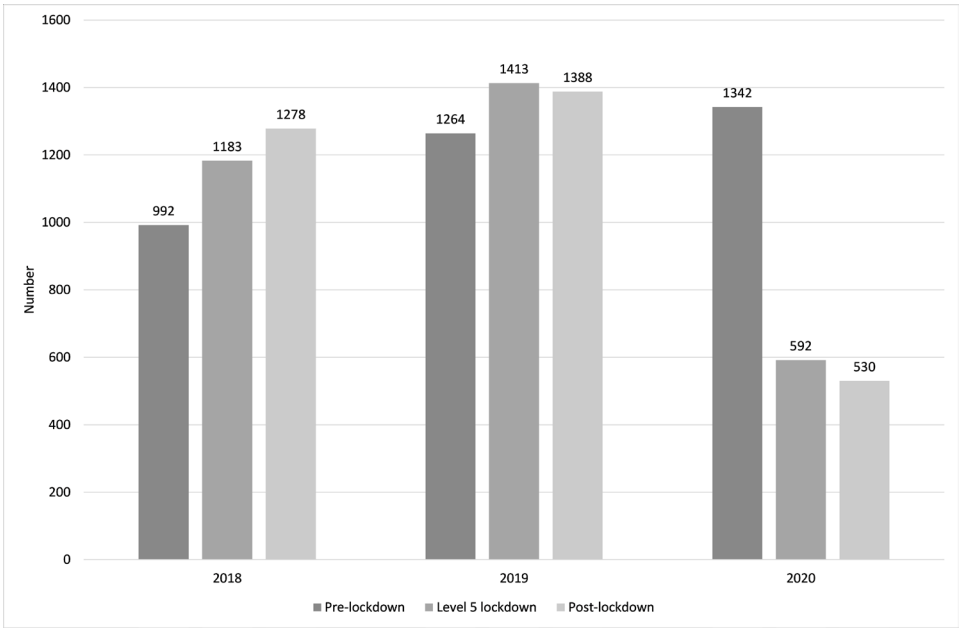

Figure 1 Number of paediatric emergency centre visits over a 5-week period before, during and after the COVID-19 level 5 lockdown.

Table 1 Demographics and characteristics of paediatric patients presenting to the emergency centre during the level 5 COVID-19 lockdown period and corresponding 5-week periods immediately before and after the lockdown

Variables n (%)	21 February–26 March (prelockdown)	27 March–30 April (level 5 lockdown)	1 May–4 June (postlockdown)
Age (year)			
<1	243 (18.1)	169 (28.5)*	116 (21.9)†
1–5	787 (58.6)	314 (53)*	279 (52.6)
>5	312 (23.2)	109 (18.4)*	135 (25.5)†
Gender			
Female	565 (42.1)	267 (45.1)	251 (47.4)
Male	777 (57.9)	325 (54.9)	279 (52.6)
Transport method			
Self	1115 (83.1)	489 (82.6)	476 (89.8)†
Ambulance	145 (10.8)	69 (11.7)	52 (9.8)
Police or fire service	0 (0)	0 (0)	0 (0)
Unknown	82 (6.1)	34 (5.7)	2 (0.4)†
Arrival from			
Scene/home	1000 (74.5)	485 (81.9)*‡	457 (86.2)§
Other healthcare facility	260 (19.4)	74 (12.5)*‡	52 (9.8)§
General practitioner	81 (6)	33 (5.6)	21 (4)§
Unknown	1 (0.1)	0 (0)	0 (0)
Triage category			
Non-urgent (green)	344 (25.6)	142 (24)	172 (32.5)†§
Urgent (yellow)	663 (49.4)	300 (50.7)	256 (48.3)
Very urgent (orange)	267 (19.9)	115 (19.4)	78 (14.7)†§
Emergency (red)	30 (2.2)	25 (4.2)*	17 (3.2)
Unknown	38 (2.8)	10 (1.7)	7 (1.3)
Disposition			
Death	4 (0.3)	4 (0.7)	0 (0)
Referred to in-hospital disciplines	163 (12.1)¶	105 (17.7)*	91 (17.2)§
Discharged	871 (64.9)	351 (59.3)*‡	346 (65.3)†§
Absconded	160 (11.9)¶	33 (5.6)*	13 (2.5)†§
Transferred to higher level facility	92 (6.9)	64 (10.8)*‡	65 (12.3)§
Refer to other	52 (3.9)¶	35 (5.9)	15 (2.8)†

*Statistically significant difference (p<0.05) between prelockdown period 2020 and level 5 lockdown period 2020 (see online supplemental table 2).
†Statistically significant difference (p<0.05) between level 5 lockdown period 2020 and postlockdown period 2020 (see online supplemental table 2).
‡Statistically significant difference (p<0.05) between level 5 lockdown period 2019 and 2020 (see online supplemental table 2).
§Statistically significant difference (p<0.05) between postlockdown period 2019 and 2020 (see online supplemental table 2).
¶Statistically significant difference (p<0.05) between prelockdown period 2019 and 2020 (see online supplemental table 2).

came into effect, the paediatric department has been responsible for over 90% of acute paediatric presentations to free up emergency centre staff to assist with the adult workload. This was made possible by closing the paediatric outpatient department and reverting to telephonic consultations that needed less staff.

An electronic patient tracking and registration database (Hospital and Emergency Centre Tracking Information System (HECTIS)) is used to collect routine clinical data for each patient that is managed within the emergency centre.

HECTIS is an official electronic application of the Western Cape Department of Health, which follows the flow of patients in an emergency centre from arrival to discharge or admission. It is used by numerous emergency centres to streamline patient processes and capture data related to process times, triage scores, International Statistical Classification of Diseases and Related Health

Problems, 10th Revision (ICD-10) diagnoses and dispositions. The database has been built on an Oracle platform and is stored off-site. The database is access controlled, and authorised users are granted access and authorisation according to their specific clinical role. A triage nurse will thus have access to different parts of the database than a clinician in the emergency centre.

Study participants

Convenience sampling was used to include all patients <13 years of age that presented to the emergency centre of Mitchells Plain Hospital over the study periods. Time periods included the level 5 lockdown period (27 March 2020–30 April 2020), a 5-week period immediately before the lockdown (21 February 2020–26 March 2020), a 5-week period immediately after the lockdown (1 May 2020–4 June 2020) and corresponding periods during 2018 and 2019.

Data collection and management

Data were exported from the HECTIS database for the various study periods. Variables included age, gender, mode of transport, type of presentation, triage category, ICD-10 diagnosis, process times and disposition. The triage category was determined at arrival to the hospital, and patients were categorised into emergency (red), very urgent (orange), urgent (yellow) and non-urgent (green) as stipulated by the SATS.[16] Patients' diagnosis was determined from ICD-10 codes documented as the main diagnosis. Disposition refers to where a patient is being discharged from the emergency centre. Patient process times were calculated from electronic timestamps and included time to triage (arrival at emergency centre to time of triage), time to consultation (arrival at emergency centre to time seen by physician), time to disposition (arrival at emergency centre to time when emergency centre disposition was decided) and time in emergency centre (arrival at emergency centre to time when patient left the emergency centre). Process times of patients that absconded were only included to calculate the time to triage (if a triage time was documented) and were excluded from the other process times.

Statistical analysis

Summary statistics were used to describe all variables. Categorical data are summarised using frequency counts and percentages and are presented as two-way tables or bar charts. Median was used as the measure of central tendency for continuous responses and quartiles as indicators of spread. The relationship between categorical variables was determined with the χ^2 test or the Fisher's exact test, and process times were compared with the independent samples median test. A 5% significance level was used, and data were analysed using SPSS Statistics for Windows, V.26.0.

Patient and public involvement statement

This research was done without patient involvement. Patients were not invited to comment on the study

Table 2 Top five diagnostic categories per age group presenting to the emergency centre during the level 5 COVID-19 lockdown period

All			<1 year			1–5 years			>5 year		
Rank	ICD-10 category	N (%)	Rank	ICD-10 category	n (%)	Rank	ICD-10 category	n (%)	Rank	ICD-10 category	n (%)
1	Respiratory system	141 (23.8)	1	Infectious diseases	52 (30.8)	1	Respiratory system	84 (26.8)	1	Injury and poisoning	46 (14.6)
2	Injury and poisoning	133 (22.5)	2	Respiratory system	43 (25.4)	2	Injury and poisoning	79 (25.2)	2	Respiratory system	14 (4.5)
3	Infectious diseases	110 (18.6)	3	Findings, not elsewhere classified	13 (7.7)	3	Infectious diseases	47 (15.0)	3	Infectious diseases	11 (3.5)
4	Nervous system	30 (5.1)	4	Skin and subcutaneous tissue	11 (6.5)	4	Nervous system	16 (5.1)	4	Nervous system	10 (3.2)
5	Skin and subcutaneous tissue	26 (4.4)	5	Injury and poisoning	8 (4.7)	5	Ear and mastoid process	14 (4.5)	5	Digestive system	5 (1.6)

ICD-10, International Statistical Classification of Diseases and Related Health Problems, 10th Revision.

Table 3 Actual and proportional differences of paediatric presentations to the emergency centre during the level 5 lockdown period, compared with similar 5-week periods before and after

	21 February–26 March (prelockdown) versus 27 March–30 April (level 5 lockdown)			27 March–30 April (level 5 lockdown) versus 1 May–4 June (postlockdown)		
ICD-10 category	Actual n (%)	Proportional (%)	P value	Actual n (%)	Proportional	P value
I. Certain infectious and parasitic diseases	−57 (−34.1)	6.2	<0.001	−40 (−36.4)	−5.4	0.015
VI. Diseases of the nervous system	−12 (−28.6)	2.0	0.050	−14 (−46.7)	−2.1	0.097
VIII. Diseases of the ear and mastoid process	−43 (−66.2)	−1.1	0.287	−8 (−36.4)	−1.1	0.316
X. Diseases of the respiratory system	−285 (−66.9)	−7.9	<0.001	−7 (−5.0)	1.5	0.579
XI. Diseases of the digestive system	−17 (−60.7)	−0.2	0.861	13 (118.2)	2.6	0.015
XII. Diseases of the skin and subcutaneous tissue	−23 (−46.9)	0.7	0.445	−2 (−7.7)	0.1	1.000
XIV. Diseases of the genitourinary system	−26 (−65.0)	−0.6	0.462	−2 (−14.3)	−0.1	1.000
XVIII. Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	−64 (−71.9)	−2.4	0.046	6 (24.0)	1.6	0.220
XIX. Injury, poisoning and certain other consequences of external causes	−75 (−36.1)	7.0	<0.001	20 (15.0)	6.4	0.016

ICD-10, International Statistical Classification of Diseases and Related Health Problems, 10th Revision.

design and were not consulted to develop patient relevant outcomes or interpret the results. Patients were not invited to contribute to the writing or editing of this document for readability or accuracy.

RESULTS

Overall emergency centre visits

A total of 39 905 emergency centre visits were documented over the study periods, of which 9983 were younger than 13 years of age (a 15% reduction in all (adult and paediatric) emergency centre visits compared with 2019 was observed, as well as a 35% reduction over the lockdown period).[17] One patient was excluded as the visit only pertained to special investigations; 9982 were thus analysed. There were 2464 paediatric emergency centre visits during the 2020 time periods, 1601 less than in 2019 (n=4065) and 989 less than in 2018 (n=3453). There was a 6.2% (n=78) increase in the actual number of patients seen during the 2020 prelockdown period compared with 2019, followed by a 58.1% (n=821) reduction for the level 5 lockdown periods and a 61.8% (n=858) reduction over the postlockdown periods (figure 1).

Demographics and characteristics

The demographics and characteristics of patients whom presented during 2020 are presented in table 1 (see online supplemental table 1 for data pertaining to 2018 and 2019). Significant differences during level 5 lockdown compared with the 2020 prelockdown period were seen in patient's age, referral type, triage category and disposition. The proportion of children younger than 1 year increased by 10.4% (p<0.001), with a decrease in the 1–5 year group (5.6%, p=0.022) and in patients over the age of 5 years (4.8%, p=0.02). The proportions in the age category changed as lockdown measures were eased; children over 5 years were the only group showing an increase (7.1%, p=0.005). An increase in the proportion of self-referrals occurred (7.4%, p<0.001), with a subsequent decrease in referrals from primary healthcare clinics (6.9%, p<0.001) and general practitioners (0.4%, p=0.754). Children presenting during the level 5 lockdown periods were also sicker with a 2% increase in the proportion of emergency (triaged red) cases (p=0.018), although the actual number of patients decreased (n=5). The difference in triage category most likely contributed to the proportional increase of inpatient referrals (5.6%, p=0.001), as well as patients referred for higher level of care (3.9%, p=0.004). This also resulted in a proportional decrease in patients being discharged directly home from the emergency centre (5.6%, p=0.019).

Diagnostic categories

The top three diagnostic categories during the level 5 lockdown were related to the respiratory system (n=141, 23.8%), injuries and poisonings (n=133, 22.5%) and infectious diseases (n=110, 18.6%). In the different age groups, infectious diseases were most frequent in the under 1-year group (n=52, 30.8%), respiratory-related diseases in the 1–5 year group (n=84, 26.8%) and injury-related presentations in the over 5-year group (n=46, 14.6%) (table 2). The top five diagnostic categories per age group and per time period is presented in online supplemental table 3. The actual number of presentations during the level 5 lockdown decreased in all the diagnostic categories compared with the 2020 prelockdown period (table 3). Significant reductions occurred in respiratory diseases (n=285, 66.9%, p<0.001), injuries (n=75, 36.1%, p<0.001) and infectious and parasitic diseases (n=57, 34.1%, p<0.001). Proportionally, diseases of the respiratory system decreased by 7.9%,

Table 4 Process times for paediatric patients (n=9308) presenting to the emergency centre during the 5-week COVID-19 level 5 lockdown period and corresponding periods for 3 years prior to the lockdown

Process times (minutes), median(Q1–Q3)* (maximum)	2018			2019			2020			
	21 February–26 March	27 March–30 April	1 May–4 June	21 February–26 March	27 March–30 April	1 May–4 June	21 February–26 March (prelockdown)	27 March–30 April (level 5 lockdown)	1 May–4 June (postlockdown)	P value
Time to triage	12 (5–31)(581)	15 (4–39)(803)	20 (7–47)(460)	19 (6–47)(612)	22 (7–52)(565)	16 (5–43)(368)	19 (6–49)(665)	12 (4–33)(308)	14 (5–34)(1461)	<0.001
Time to consultation	81 (45–132)(1067)	95 (54–159)(905)	104 (59–171)(1222)	107 (61–187)(654)	119 (66–214)(742)	118 (65–208)(685)	140 (71–235)(872)	49 (42–122)(590)	59 (29–101)(1054)	<0.001
Time to disposition decision	146 (94–216)(1437)	157 (99–242)(1146)	160 (106–246)(1291)	190 (121–295)(1521)	193 (121–314)(1506)	191 (112–291)(1026)	245 (156–365)(3337)	169 (95–267)(1918)	123 (70–204)(1773)	<0.001
Time in emergency centre	188 (126–278)(1438)	205 (129–320)(1797)	207 (130–330)(3800)	274 (165–495)(2043)	262 (146–428)(1717)	251 (142–411)(2632)	311 (200–492)(3353)	270 (153–459)(2349)	164 (85–423)(1984)	<0.001

*Q1–Q3: 25th–75th percentile.

infectious-related diseases increased by 6.2% and injuries increased by 7.0% (table 3) (see online supplemental table 4 for comparisons of 2020 vs 2019 and 2020 vs 2018). The diagnostic categories for all the time periods are presented in online supplemental table 5. In admitted patients, actual infectious-related diseases decreased by 40% (n=24) and diseases of the respiratory system by 63% (n=67) during the lockdown period compared with 2019. A 28% (n=14) reduction was seen in actual infectious-related and respiratory-related diseases comparing the 2020 lockdown periods (see online supplemental table 6 for the diagnostic categories of admitted patients). In patients transferred to higher level of care, actual infectious-related diseases increased by 91% (n=10) and injuries by 33% (n=4) during the lockdown period compared with 2019. A 30% (n=7) reduction was seen in the actual number of injuries and a 5% (n=1) increase in infectious-related diseases comparing the 2020 lockdown periods (see online supplemental table 7 for the diagnostic categories of transferred patients).

Process times

All process times were significantly different between the various study periods (table 4). Comparing median times between the level 5 lockdown period and the 2020 prelockdown period, time to triage decreased by 7 min ($p<0.001$), time to consultation by 91 min ($p<0.001$), time to deciding disposition by 76 min ($p<0.001$) and length of stay within the emergency centre by 41 min ($p=0.003$).

DISCUSSION

The volume of children visiting the emergency centre during and after the level 5 lockdown period was significantly lower than similar previous time periods. Significant reductions in the number of presentations were seen in respiratory diseases, infectious diseases and injuries (table 3). A reduction in the proportion of diseases related to the respiratory system occurred in all age groups, while infectious diseases increased in younger patients (<1 year) and injuries increased in children older than 1 year.

The overall reduction in paediatric emergency centre visits is similar to experiences from the SARS and MERS pandemics, as people tend to avoid or delay attending hospitals due to the fear of contracting the communicable disease.[9–11] Anecdotal evidence do suggest that attendance to the primary healthcare services also decreased. This is of concern and child health needs to be monitored closely over the coming 12 months. The likely reduction in immunisations, specifically measles, could result in outbreaks of non-COVID-19 communicable diseases causing more morbidity and mortality.[3] The impact of this would be substantially worse in impoverished communities.

The reduction in respiratory and infectious-related diseases were substantial contributors to the overall reduction in emergency centre attendance, although the

proportion of children with infectious diseases increased. These reductions are most likely multifactorial, and one important consideration could be the closing of early childhood development centres. It has been well documented that children attending crèches have a higher incidence of infectious diseases, including respiratory tract infections.[18 19] About three quarters of paediatric emergency centre attendees at Mitchells Plain Hospital are children under the age of 5 years, of whom a large proportion will normally be in formal or informal crèches while their parents work. The lockdown measures forced most parents to stay at home, thereby further reducing children's exposure to infections (COVID-19 and other) as trips to shops or work were limited.

Children presenting with injuries and poisoning decreased by a third during the level 5 lockdown period, but increased proportionally by 7% (table 3). This was not expected and could be from children bypassing the community healthcare centres; thus, children with minor injuries also presented to the hospital. However, the home is one of the most dangerous places for children. It is estimated that around 90% of unintentional injuries in young children occur in or around their home when they are supposedly being supervised by a caregiver.[20] Injury risk could also have increased if children became bored at home, while parents were most likely frustrated in the constant supervision of the children. Furthermore, anecdotal evidence suggest that the number of child abuse cases did not decrease during the lockdown periods and remain on a similar trend than before.[21] Another possible reason is the long-standing problem in South Africa where many children are looking after themselves and other children, with an understandable lack of adequate supervision.

The main strength of the study is the use of a comprehensive database that is completed in real time. Although data are not cross-checked, we expect the data to be adequately reflecting the truth. However, care should be taken to generalise the results of the study to other healthcare facilities as it reflects a single centre in a fairly distinctive setting. Diseases were categorised according to diagnostic codes (ICD-10) assigned by attending physicians. A diagnostic code was not assigned to around 10% of patients. We also did not validate whether the correct diagnosis were made, neither did we attempt to ensure that the correct diagnostic code were assigned to the diagnosis. This could have resulted in non-systematic error.

CONCLUSION

Significantly less children presented to the emergency centre since the implementation of the national COVID-19 level 5 lockdown. The closure of early childhood development centres and schools, together with the restriction of movement of children and their caregivers, markedly reduced the infectious and respiratory-related component of paediatric attendees. The burden of injuries in resource-limited societies remains a problem, even during a period of national lockdown. However, the change in paediatric presentations to the emergency centre across all COVID-19 lockdown levels remains unknown and should be investigated in future.

Contributors DJvH and CH conceived the study. LMA, CH, and KE undertook data collection. LMA and DJvH cleaned the data, and DJvH and CH did the data analyses. LMA drafted the manuscript, and the remaining authors critiqued the paper for important intellectual content. All authors read and approved the final version of the manuscript. LMA is the guarantor.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not required.

Ethics approval The study was approved by the Health Research Ethics Committee of Stellenbosch University (Ref: N20/04/009_COVID-19) and included a waiver of informed consent.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Deidentified participant data are available from the corresponding author (orcid.org/0000-0002-4300-0372) on reasonable request.

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Supplementary table 1. Demographics and characteristics of paediatric patients presenting to the emergency centre during the level 5 COVID-19 lockdown period and corresponding 5-week periods immediately before and after the lockdown and for two previous years.

		2018			2019			2020		
Variables n (%)		**21 Feb – 26 Mar**	**27 Mar – 30 Apr**	**01 May – 04 Jun**	**21 Feb – 26 Mar**	**27 Mar – 30 Apr**	**01 May – 04 Jun**	**21 Feb – 26 Mar (Pre-lockdown)**	**27 Mar – 30 Apr (Level 5 lockdown)**	**01 May – 04 Jun (Post-lockdown)**
Age (year)	<1	210 (21.2%)	372 (31.4%)	368 (28.8%)	249 (19.7%)	351 (24.8%)	312 (22.5%)	243 (18.1%)	169 (28.5%)[a]	116 (21.9%)[b]
	1-5	528 (53.2%)	592 (50%)	677 (53%)	717 (56.7%)	766 (54.2%)	742 (53.5%)	787 (58.6%)	314 (53%)[a]	279 (52.6%)
	>5	254 (25.6%)	219 (18.5%)	233 (18.2%)	298 (23.6%)	296 (20.9%)	334 (24.1%)	312 (23.2%)	109 (18.4%)[a]	135 (25.5%)[b]
Gender	Female	436 (44%)	509 (43%)	588 (46%)	537 (42.5%)	609 (43.1%)	610 (43.9%)	565 (42.1%)	267 (45.1%)	251 (47.4%)
	Male	556 (56%)	674 (57%)	690 (54%)	727 (57.5%)	804 (56.9%)	778 (56.1%)	777 (57.9%)	325 (54.9%)	279 (52.6%)
Transport method	Self	785 (79.1%)	920 (77.8%)	1082 (84.7%)	1025 (81.1%)	1171 (82.9%)	1267 (91.3%)	1115 (83.1%)	489 (82.6%)	476 (89.8%)[b]
	Ambulance	130 (13.1%)	178 (15%)	193 (15.1%)	152 (12%)	133 (9.4%)	120 (8.6%)	145 (10.8%)	69 (11.7%)	52 (9.8%)
	Police or Fire service	2 (0.2%)	1 (0.1%)	1 (0.1%)	2 (0.2%)	4 (0.3%)	1 (0.1%)	0 (0%)	0 (0%)	0 (0%)
	Unknown	75 (7.6%)	84 (7.1%)	2 (0.2%)	85 (6.7%)	105 (7.4%)	0 (0%)	82 (6.1%)	34 (5.7%)	2 (0.4%)[b]
Arrival from	Scene / home	658 (66.3%)	835 (70.6%)	907 (71%)	931 (73.7%)	1069 (75.7%)	1067 (76.9%)	1000 (74.5%)	485 (81.9%)[a,c]	457 (86.2%)[d]
	Other healthcare facility	262 (26.4%)	266 (22.5%)	285 (22.3%)	250 (19.8%)	242 (17.1%)	220 (15.9%)	260 (19.4%)	74 (12.5%)[a,c]	52 (9.8%)[d]
	General Practitioner	72 (7.3%)	82 (6.9%)	86 (6.7%)	83 (6.6%)	99 (7%)	101 (7.3%)	81 (6%)	33 (5.6%)	21 (4%)[d]
	Unknown	0 (0%)	0 (0%)	0 (0%)	0 (0%)	3 (0.2%)	0 (0%)	1 (0.1%)	0 (0%)	0 (0%)
Triage category	Non-urgent (Green)	238 (24%)	202 (17.1%)	202 (15.8%)	311 (24.6%)	287 (20.3%)	241 (17.4%)	344 (25.6%)	142 (24%)	172 (32.5%)[b,d]
	Urgent (Yellow)	516 (52%)	622 (52.6%)	760 (59.5%)	639 (50.6%)	758 (53.6%)	733 (52.8%)	663 (49.4%)	300 (50.7%)	256 (48.3%)
	Very urgent (Orange)	181 (18.2%)	286 (24.2%)	255 (20%)	246 (19.5%)	294 (20.8%)	351 (25.3%)	267 (19.9%)	115 (19.4%)	78 (14.7%)[b,d]
	Emergency (Red)	33 (3.3%)	41 (3.5%)	35 (2.7%)	39 (3.1%)	40 (2.8%)	35 (2.5%)	30 (2.2%)	25 (4.2%)[a]	17 (3.2%)
	Unknown	24 (2.4%)	32 (2.7%)	26 (2%)	29 (2.3%)	34 (2.4%)	28 (2%)	38 (2.8%)	10 (1.7%)	7 (1.3%)
Disposition	Death	2 (0.2%)	0 (0%)	1 (0.1%)	1 (0.1%)	4 (0.3%)	3 (0.2%)	4 (0.3%)	4 (0.7%)	0 (0%)
	Referred to in-hospital disciplines	193 (19.5%)	251 (21.2%)	293 (22.9%)	210 (16.6%)	209 (14.8%)	159 (11.5%)	163 (12.1%)[e]	105 (17.7%)[a]	91 (17.2%)[d]
	Discharged	674 (67.9%)	770 (65.1%)	817 (63.9%)	862 (68.2%)	946 (66.9%)	983 (70.8%)	871 (64.9%)	351 (59.3%)[a,c]	346 (65.3%)[b,d]
	Absconded	28 (2.8%)	42 (3.6%)	58 (4.5%)	66 (5.2%)	99 (7%)	92 (6.6%)	160 (11.9%)[e]	33 (5.6%)[a]	13 (2.5%)[b,d]
	Transferred to higher level facility	58 (5.8%)	86 (7.3%)	62 (4.9%)	101 (8%)	90 (6.4%)	87 (6.3%)	92 (6.9%)	64 (10.8%)[a,c]	65 (12.3%)[d]
	Refer to other	37 (3.7%)	34 (2.9%)	47 (3.7%)	24 (1.9%)	65 (4.6%)	64 (4.6%)	52 (3.9%)[e]	35 (5.9%)	15 (2.8%)[b]

[a] Statistically significant difference ($p<0.05$) between pre-lockdown period 2020 and level 5 lockdown period 2020 (see supplementary table 2)

[b] Statistically significant difference ($p<0.05$) between level 5 lockdown period 2020 and post-lockdown period 2020 (see supplementary table 2)

[c] Statistically significant difference ($p<0.05$) between level 5 lockdown period 2019 and 2020 (see supplementary table 2)

[d] Statistically significant difference ($p<0.05$) between post-lockdown period 2019 and 2020 (see supplementary table 2)

[e] Statistically significant difference ($p<0.05$) between pre-lockdown period 2019 and 2020 (see supplementary table 2)

Supplementary table 2. Differences between different study periods of demographic and clinical characteristics of paediatric patients presenting to the emergency centre

	2020 vs 2019						2020			
	21 Feb – 26 Mar		27 Mar – 30 Apr		01 May – 04 Jun		Pre-lockdown vs Level 5 lockdown		Level 5 lockdown vs Post-lockdown	
Variables n (%)	**n (%)**	**p**	**n (%)**	**p**	**n (%)**	**p**	**n (%)**	**p**	**n (%)**	**p**
Age (year)										
<1	-6 (-2.4)	0.317	-182 (-51.9)	0.094	-196 (-62.8)	0.806	-74 (-30.5)	<0.001	-53 (-31.4)	0.011
1-5	70 (9.7)	0.322	-452 (-59.0)	0.659	-463 (-62.4)	0.759	-473 (-60.1)	0.022	-35 (-11.1)	0.905
>5	14 (4.)	0.853	-187 (-63.2)	0.201	-199 (-59.6)	0.553	-203 (-65.1)	0.020	26 (23.9)	0.005
Gender										
Female	28 (5.2)	0.874	-342 (-56.2)	0.430	-359 (-58.9)	0.182	-298 (-52.7)	0.232	-16 (-6.0)	0.472
Male	50 (6.9)	0.000	-479 (-59.6)		-499 (-64.1)	0.000	-452 (-58.2)	0.000	-46 (-14.2)	0.000
Transport method										
Self	90 (8.8)	0.201	-682 (-58.2)	0.897	-791 (-62.4)	0.330	-626 (-56.1)	0.844	-13 (-2.7)	0.001
Ambulance	-7 (-4.6)	0.355	-64 (-48.1)	0.143	-68 (-56.7)	0.475	-76 (-52.4)	0.637	-17 (-24.6)	0.336
Police or Fire service	-2 (-100)	0.235	-4 (-100)	0.326	-1 (-100)	1.000	0 (0)	---	0 (0)	---
Unknown	-3 (-3.5)	0.575	-71 (-67.6)	0.179	2 (200)	0.076	-48 (-58.5)	0.758	-32 (-94.1)	<0.001
Arrival from										
Scene / home	69 (7.4)	0.623	-584 (-54.6)	0.002	-610 (-57.2)	<0.001	-515 (-51.5)	<0.001	-28 (-5.8)	0.051
Other healthcare facility	10 (4)	0.805	-168 (-69.4)	0.011	-168 (-76.4)	0.001	-186 (-71.5)	<0.001	-22 (-29.7)	0.157
General Practitioner	-2 (-2.4)	0.628	-66 (-66.7)	0.277	-80 (-79.2)	0.009	-48 (-59.3)	0.754	-12 (-36.4)	0.213
Unknown	1 (100)	1.000	-3 (-100)	0.560	0 (0)	---	-1 (-100)	1.000	0 (0)	---
Triage category										
Non-urgent (Green)	33 (10.6)	0.557	-145 (-50.5)	0.073	-69 (-28.6)	<0.001	-202 (-58.2)	0.460	-30 (-14.2)	0.002
Urgent (Yellow)	24 (3.7)	0.292	-458 (-60.4)	0.239	-477 (-65.1)	0.082	-363 (-58.7)	0.622	-44 (-21.1)	0.437
Very urgent (Orange)	21 (8.5)	0.805	-179 (-60.9)	0.504	-273 (-77.8)	<0.001	-152 (-54.8)	0.853	-37 (-14.7)	0.039
Emergency (Red)	-9 (-23.1)	0.182	-15 (-37.5)	0.128	-18 (-51.4)	0.432	-5 (-56.9)	0.018	-8 (-32.2)	0.432
Unknown	9 (31.0)	0.458	-24 (-70.6)	0.404	-21 (-75)	0.347	-28 (-73.7)	0.155	-3 (-30)	0.636
Disposition										
Referred to in-hospital disciplines	3 (300)	0.376	0 (0)	0.246	-3 (-100)	0.565	0 (0)	0.258	-4 (-100)	0.127
Discharged	-47 (-22.4)	0.001	-104 (-49.8)	0.106	-68 (-42.8)	0.001	-58 (-35.6)	0.001	-14 (-13.3)	0.814
Absconded	9 (1.0)	0.081	-595 (-62.9)	0.001	-637 (-64.8)	0.020	-520 (-59.7)	0.019	-5 (-1.4)	0.042
Transferred to higher level facility	94 (142.4)	0.001	-66 (-66.7)	0.277	-79 (-85.9)	0.001	-127 (-79.4)	0.001	-20 (-60.6)	0.010
Refer to other	-9 (-8.9)	0.295	-26 (-28.9)	0.001	-22 (-25.3)	<0.001	-28 (-30.4)	0.004	1 (1.6)	0.455
Referred to in-hospital disciplines	28 (116.7)	0.003	-30 (-46. 2)	0.260	-49 (-76.6)	0.094	-17 (-32.7)	0.056	-20 (-57.1)	0.014

Pre-lockdown period: 21 February – 26 March; Lockdown period: 27 March – 30 April; Post-lockdown period: 01 May – 04 June

Supplementary table 3. Top five diagnostic categories per age group presenting to the emergency centre during the level 5 COVID-19 lockdown period and similar time periods.

27 March – 30 April 2019		21 February – 26 March 2020 (Pre-lockdown)		27 March – 30 April 2020 (level 5 lockdown)		01 May – 04 June 2020 (Post-lockdown)	
ICD-10 Category	**n (%)**	**ICD-10 Category**	**n (%)**	**ICD-10 Category**	**n (%)**	**ICD-10 Category**	**n (%)**
All							
Respiratory system	442 (35.0)	Respiratory system	426 (31.7)	Respiratory system	141 (23.8)	Injury and poisoning	153 (28.9)
Infectious diseases	247 (19.5)	Injury and poisoning	208 (15.5)	Injury and poisoning	133 (22.5)	Respiratory system	134 (25.3)
Injury and poisoning	209 (16.5)	Infectious diseases	167 (12.4)	Infectious diseases	110 (18.6)	Infectious diseases	70 (13.2)
Findings, not elsewhere classified	51 (4.0)	Findings, not elsewhere classified	89 (6.6)	Nervous system	30 (5.1)	Findings, not elsewhere classified	31 (5.8)
Nervous system	49 (3.9)	Ear and mastoid process	65 (4.8)	Skin and subcutaneous tissue	26 (4.4)	Digestive system	24 (4.5)
						Skin and subcutaneous tissue	24 (4.5)
<1 year							
Respiratory system	200 (57.0)	Respiratory system	78 (32.1)	Infectious diseases	52 (30.8)	Infectious diseases	33 (28.4)
Infectious diseases	65 (18.5)	Infectious diseases	61 (25.1)	Respiratory system	43 (25.4)	Respiratory system	29 (25.0)
Findings, not elsewhere classified	11 (3.1)	Findings, not elsewhere classified	20 (8.2)	Findings, not elsewhere classified	13 (7.7)	Injury and poisoning	13 (11.2)
Injury and poisoning	10 (2.8)	Injury and poisoning	18 (7.4)	Skin and subcutaneous tissue	11 (6.5)	Skin and subcutaneous tissue	9 (7.8)
Skin and subcutaneous tissue	7 (2.0)	Skin and subcutaneous tissue	10 (4.1)	Injury and poisoning	8 (4.7)	Digestive system	6 (5.2)
Ear and mastoid process	7 (2.0)						
1-5 year							
Respiratory system	294 (38.4)	Respiratory system	284 (36.1)	Respiratory system	84 (26.8)	Injury and poisoning	93 (33.3)
Infectious diseases	125 (16.3)	Injury and poisoning	108 (13.7)	Injury and poisoning	79 (25.2)	Respiratory system	79 (28.3)
Injury and poisoning	78 (10.2)	Infectious diseases	91 (11.6)	Infectious diseases	47 (15.0)	Infectious diseases	23 (8.2)
Ear and mastoid process	50 (6.5)	Ear and mastoid process	51 (6.5)	Nervous system	16 (5.1)	Findings, not elsewhere classified	20 (7.2)
Findings, not elsewhere classified	32 (4.2)	Findings, not elsewhere classified	36 (4.6)	Ear and mastoid process	14 (4.5)	Ear and mastoid process	12 (4.3)
> 5 year							
Respiratory system	58 (7.6)	Injury and poisoning	82 (10.4)	Injury and poisoning	46 (14.6)	Injury and poisoning	47 (16.8)
Injury and poisoning	57 (7.4)	Respiratory system	64 (8.1)	Respiratory system	14 (4.5)	Respiratory system	26 (9.3)
Infectious diseases	38 (5.0)	Findings, not elsewhere classified	33 (4.2)	Infectious diseases	11 (3.5)	Infectious diseases	14 (5.0)
Findings, not elsewhere classified	27 (3.5)	Nervous system	19 (2.4)	Nervous system	10 (3.2)	Digestive system	12 (4.3)
Nervous system	24 (3.1)	Skin and subcutaneous tissue	16 (2.0)	Digestive system	5 (1.6)	Nervous system	7 (2.5)
		Genitourinary system	16 (2.0)				

ICD-10: International Statistical Classification of Diseases and Related Health Problems, 10th revision

Supplementary table 4. Actual and proportional differences of paediatric presentations to the emergency centre during the level 5 lockdown period and similar 5-week periods before and after, compared to the previous two years.

	2020 vs 2018									2020 vs 2019								
	21 Feb – 26 Mar (Pre-lockdown)			27 Mar – 30 Apr (Level 5 lockdown)			01 May – 04 Jun (Post-lockdown)			21 Feb – 26 Mar (Pre-lockdown)			27 Mar – 30 Apr (Level 5 lockdown)			01 May – 04 Jun (Post-lockdown)		
ICD-10 category	**Actual n (%)**	**Proportional**	**p**	**Actual n (%)**	**Proportional**	**p**	**Actual n (%)**	**Proportional**	**p**	**Actual n (%)**	**Proportional**	**p**	**Actual n (%)**	**Proportional**	**p**	**Actual n (%)**	**Proportional**	**p**
I Certain infectious and parasitic diseases	-53 (-31.7)	-9.8%	0.574	-97 (-88.2)	1.1%	0.564	-155 (-221.4)	-4.4%	0.210	-80 (-32.4)	-7.1%	***<0.001***	-118 (-51.8)	2.5%	0.191	-97 (-58.1)	1.2%	0.486
VI Diseases of the nervous system	21 (50)	1.0%	***<0.001***	14 (46.7)	3.7%	***<0.001***	-8 (-50)	1.1%	0.133	-7 (-14.3)	-0.8%	0.337	-14 (-31.8)	2.0%	***0.038***	-23 (-59.0)	0.2%	0.878
VIII Diseases of the ear and mastoid process	40 (61.5)	2.3%	0.927	-23 (-104.5)	-0.1%	0.927	-52 (-371.4)	-2.6%	0.018	22 (51.2)	1.4%	0.076	-42 (-65.6)	-0.8%	0.469	-50 (-78.1)	-2.0%	0.053
X Diseases of the respiratory system	118 (27.7)	0.7%	***<0.001***	-359 (-254.6)	-18.5%	***<0.001***	-378 (-282.1)	-14.8%	***<0.001***	-16 (-3.6)	-3.3%	0.081	-411 (-74,5)	-15.3%	***<0.001***	-466 (-77.7)	-17.9%	***<0.001***
XI Diseases of the digestive system	-6 (-21.4)	-1.3%	0.370	-19 (-172.7)	-0.6%	0.370	-3 (-12.5)	2.4%	0.005	2 (7.7)	0.0%	1.000	-18 (-62.1)	-0.2%	0.862	1 (4.3)	2.8%	0.000
XII Diseases of the skin and subcutaneous tissue	-33 (-67.3)	-4.6%	0.580	-33 (-126.9)	-0.6%	0.580	-26 (-108.3)	0.6%	0.547	1 (2.1)	-0.1%	0.819	-20 (-43.5)	1.1%	0.236	-12 (-33.3)	1.9%	***0.039***
XIV Diseases of the genitourinary system	7 (17.5)	-0.3%	0.329	-6 (-42.9)	0.7%	0.329	-13 (-108.3)	0.3%	0.674	22 (122.2)	1.6%	***0.008***	-13 (-48.5)	0.5%	0.604	-10 (-45.5)	0.7%	0.334
XVIII Symptoms, signs and	39 (43.8)	1.6%	0.280	-39 (-156.0)	-1.2%	0.280	-27 (-87.1)	1.3%	0.241	38 (74.5)	2.6%	***0.004***	-45 (-64.3)	-0.8%	0.493	-42 (-57.5)	0.5%	0.652

abnormal clinical and laboratory findings, not elsewhere classified																		
XIX Injury, poisoning and certain other consequences of external causes	75 (36.1)	2.1%	***<0.001***	14 (10.5)	12.4%	***<0.001***	59 (38.6)	21.5%	***<0.001***	-1 (-0.5)	-1.0%	0.487	-12 (-8.3)	12.2%	***<0.001***	-21 (-12.1)	16.4%	***<0.001***

Supplementary table 5. Diagnostic categories of paediatric patients presenting to the emergency centre during the level 5 COVID-19 lockdown period and corresponding time periods.

	2018			2019			2020		
ICD-10 Category, n(%)	**21 Feb – 26 Mar**	**27 Mar – 30 Apr**	**01 May – 04 Jun**	**21 Feb – 26 Mar**	**27 Mar – 30 Apr**	**01 May – 04 Jun**	**21 Feb – 26 Mar (Pre-lockdown)**	**27 Mar – 30 Apr (Level 5 lockdown)**	**01 May – 04 Jun (Post-lockdown)**
I Certain infectious and parasitic diseases	220 (22.2%)	207 (17.5%)	225 (17.6%)	247 (19.5%)	228 (16.1%)	167 (12%)	167 (12.4%)	110 (18.6%)	70 (13.2%)
II Neoplasms	1 (0.1%)	2 (0.2%)	0 (0%)	0 (0%)	3 (0.2%)	2 (0.1%)	0 (0%)	0 (0%)	0 (0%)
III Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	0 (0%)	0 (0%)	1 (0.1%)	2 (0.2%)	1 (0.1%)	0 (0%)	1 (0.1%)	1 (0.2%)	3 (0.6%)
IV Endocrine, nutritional and metabolic diseases	1 (0.1%)	1 (0.1%)	7 (0.5%)	8 (0.6%)	7 (0.5%)	8 (0.6%)	2 (0.1%)	1 (0.2%)	2 (0.4%)
V Mental and behavioural disorders	1 (0.1%)	3 (0.3%)	3 (0.2%)	2 (0.2%)	0 (0%)	6 (0.4%)	0 (0%)	2 (0.3%)	0 (0%)
VI Diseases of the nervous system	21 (2.1%)	16 (1.4%)	24 (1.9%)	49 (3.9%)	44 (3.1%)	39 (2.8%)	42 (3.1%)	30 (5.1%)	16 (3%)
VII Diseases of the eye and adnexa	6 (0.6%)	4 (0.3%)	8 (0.6%)	10 (0.8%)	11 (0.8%)	14 (1%)	9 (0.7%)	2 (0.3%)	1 (0.2%)
VIII Diseases of the ear and mastoid process	25 (2.5%)	45 (3.8%)	66 (5.2%)	43 (3.4%)	64 (4.5%)	64 (4.6%)	65 (4.8%)	22 (3.7%)	14 (2.6%)
IX Diseases of the circulatory system	0 (0%)	0 (0%)	2 (0.2%)	3 (0.2%)	6 (0.4%)	2 (0.1%)	1 (0.1%)	1 (0.2%)	0 (0%)
X Diseases of the respiratory system	308 (31%)	500 (42.3%)	512 (40.1%)	442 (35%)	552 (39.1%)	600 (43.2%)	426 (31.7%)	141 (23.8%)	134 (25.3%)
XI Diseases of the digestive system	34 (3.4%)	30 (2.5%)	27 (2.1%)	26 (2.1%)	29 (2.1%)	23 (1.7%)	28 (2.1%)	11 (1.9%)	24 (4.5%)
XII Diseases of the skin and subcutaneous tissue	82 (8.3%)	59 (5%)	50 (3.9%)	48 (3.8%)	46 (3.3%)	36 (2.6%)	49 (3.7%)	26 (4.4%)	24 (4.5%)
XII Diseases of the musculoskeletal system and connective tissue	1 (0.1%)	6 (0.5%)	3 (0.2%)	8 (0.6%)	17 (1.2%)	8 (0.6%)	2 (0.1%)	2 (0.3%)	7 (1.3%)
XIV Diseases of the genitourinary system	33 (3.3%)	20 (1.7%)	25 (2%)	18 (1.4%)	27 (1.9%)	22 (1.6%)	40 (3%)	14 (2.4%)	12 (2.3%)
XV Pregnancy, childbirth and the puerperium	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (0.2%)
XVI Certain conditions originating in the perinatal period	0 (0%)	1 (0.1%)	3 (0.2%)	2 (0.2%)	2 (0.1%)	2 (0.1%)	2 (0.1%)	4 (0.7%)	3 (0.6%)
XVII Congenital malformations, deformations and chromosomal abnormalities	1 (0.1%)	0 (0%)	1 (0.1%)	1 (0.1%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (0.4%)
XVIII Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	50 (5%)	64 (5.4%)	58 (4.5%)	51 (4%)	70 (5%)	73 (5.3%)	89 (6.6%)	25 (4.2%)	31 (5.8%)
XIX Injury, poisoning and certain other consequences of external causes	133 (13.4%)	119 (10.1%)	94 (7.4%)	209 (16.5%)	145 (10.3%)	174 (12.5%)	208 (15.5%)	133 (22.5%)	153 (28.9%)
XX External causes of morbidity and mortality	36 (3.6%)	41 (3.5%)	40 (3.1%)	6 (0.5%)	9 (0.6%)	8 (0.6%)	11 (0.8%)	4 (0.7%)	5 (0.9%)
XXI Factors influencing health status and contact with health services	6 (0.6%)	10 (0.8%)	14 (1.1%)	14 (1.1%)	9 (0.6%)	2 (0.1%)	15 (1.1%)	8 (1.4%)	7 (1.3%)
Unknown	33 (3.3%)	55 (4.6%)	115 (9%)	75 (5.9%)	143 (10.1%)	138 (9.9%)	185 (13.8%)	55 (9.3%)	21 (4%)

Supplementary table 6. Diagnostic categories of paediatric patients admitted during the level 5 COVID-19 lockdown period and corresponding 5-week periods immediately before and after the lockdown and for two previous years.

	2018			2019			2020		
	21 Feb – 26 Mar	27 Mar – 30 Apr	01 May – 04 Jun	21 Feb – 26 Mar	27 Mar – 30 Apr	01 May – 04 Jun	21 Feb – 26 Mar (Pre-lockdown)	27 Mar – 30 Apr (Level 5 lockdown)	01 May – 04 Jun (Post-lockdown)
ICD-10 category	**n (%)**	**n (%)**	**n (%)**	**n (%)**	**n (%)**	**n (%)**	**n (%)**	**n (%)**	**n (%)**
I Certain infectious and parasitic diseases	82 (42.5%)	78 (31.1%)	85 (29.0%)	64 (30.5%)	60 (28.7%)	37 (23.3%)	50 (30.7%)	36 (34.3%)	29 (31.9%)
VI Diseases of the nervous system	9 (4.7%)	8 (3.2%)	8 (2.7%)	28 (13.3%)	19 (9.1%)	12 (7.5%)	20 (12.3%)	7 (6.7%)	4 (4.4%)
VIII Diseases of the ear and mastoid process	3 (1.6%)	1 (0.4%)	2 (0.7%)	1 (0.5%)	3 (1.4%)	8 (5.0%)	6 (3.7%)	1 (1.0%)	0 (0.0%)
X Diseases of the respiratory system	73 (37.8%)	140 (55.8%)	131 (44.7%)	98 (46.7%)	107 (51.2%)	72 (45.4%)	56 (34.4%)	40 (38.1%)	37 (40.7%)
XI Diseases of the digestive system	2 (1.0%)	1 (0.4%)	1 (0.3%)	1 (0.5%)	0 (0.0%)	2 (1.3%)	2 (1.2%)	2 (1.9%)	0 (0.0%)
XII Diseases of the skin and subcutaneous tissue	7 (3.6%)	4 (1.6%)	1 (0.3%)	1 (0.5%)	3 (1.4%)	1 (0.6%)	4 (2.5%)	0 (0.0%)	1 (1.1%)
XIV Diseases of the genitourinary system	4 (2. %)	1 (0.4%)	0 (0.0%)	2 (1.0%)	1 (0.5%)	0 (0.0%)	7 (4.3%)	4 (3.8%)	3 (3.3%)
XVIII Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	10 (5.2%)	14 (5.6%)	15 (5.1%)	9 (4.3%)	6 (2.9%)	14 (8.8%)	13 (8.0%)	6 (5.7%)	5 (5.5%)
XIX Injury, poisoning and certain other consequences of external causes	1 (0.5%)	1 (0.4%)	5 (1.7%)	1 (0.5%)	1 (0.5%)	2 (1.3%)	3 (1.8%)	1 (1.0%)	3 (3.3%)
Other	2 (1.0%)	3 (1.2%)	45 (15.4%)	5 (2.4%)	9 (4.3%)	11 (6.9%)	2 (1.2%)	8 (7.6%)	9 (9.9%)
	193 (100%)	251 (100%)	293 (100%)	210 (100%)	209 (100%)	159 (100%)	163 (100%)	105 (100%)	91 (100%)

Supplementary table 7. Diagnostic categories of paediatric patients transferred to higher level of care during the level 5 COVID-19 lockdown period and corresponding 5-week periods immediately before and after the lockdown and for two previous years.

	2018			2019			2020		
	21 Feb – 26 Mar	27 Mar – 30 Apr	01 May – 04 Jun	21 Feb – 26 Mar	27 Mar – 30 Apr	01 May – 04 Jun	21 Feb – 26 Mar (Pre-lockdown)	27 Mar – 30 Apr (Level 5 lockdown)	01 May – 04 Jun (Post-lockdown)
ICD-10 category	**n (%)**	**n (%)**	**n (%)**	**n (%)**	**n (%)**	**n (%)**	**n (%)**	**n (%)**	**n (%)**
I Certain infectious and parasitic diseases	9 (15.5%)	15 (17.4%)	7 (11.3%)	15 (14.9%)	11 (12.2%)	11 (12.6%)	20 (21.7%)	21 (32.8%)	7 (10.8%)
VI Diseases of the nervous system	5 (8.6%)	5 (5.8%)	5 (8.1%)	8 (7.9%)	7 (7.8%)	12 (13.8%)	7 (7.6%)	6 (9.4%)	3 (4.6%)
X Diseases of the respiratory system	8 (13.8%)	23 (26.7%)	15 (24.2%)	22 (21.8%)	30 (33.3%)	20 (23.0%)	10 (10.9%)	6 (9.4%)	12 (18.5%)
XI Diseases of the digestive system	8 (13.8%)	6 (7.0%)	2 (3.2%)	5 (5.0%)	7 (7.8%)	5 (5.7%)	11 (12.0%)	3 (4.7%)	11 (16.9%)
XII Diseases of the skin and subcutaneous tissue	10 (17.2%)	6 (7.0%)	9 (14.5%)	9 (8.9%)	7 (7.8%)	4 (4.6%)	10 (10.9%)	6 (9.4%)	3 (4.6%)
XIV Diseases of the genitourinary system	0 (0.0%)	2 (2.3%)	0 (0.0%)	2 (2.0%)	1 (1.1%)	3 (3.4%)	4 (4.3%)	2 (3.1%)	1 (1.5%)
XVIII Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	1 (1.7%)	4 (4.7%)	2 (3.2%)	3 (3.0%)	7 (7.8%)	1 (1.1%)	3 (3.3%)	0 (0.0%)	2 (3.1%)
XIX Injury, poisoning and certain other consequences of external causes	15 (25.9%)	16 (18.6%)	13 (21.0%)	30 (29.7%)	12 (13.3%)	25 (28.7%)	23 (25.0%)	16 (25.0%)	23 (35.4%)
Other	2 (3.4%)	9 (10.5%)	9 (14.5%)	7 (6.9%)	8 (8.9%)	6 (6.9%)	4 (4.3%)	4 (6.3%)	3 (4.6%)
	58 (100%)	86 (100%)	62 (100%)	101 (100%)	90 (100%)	87 (100%)	92 (100%)	64 (100%)	65 (100%)

PART B: ADDENDA

Addendum 1: Research Proposal

The effect of the COVID-19 social distancing measures on the workload, case mix and mortality of patients presenting to the emergency centre of two district-level public hospitals in Cape Town

Principal Investigator: Dr DJ van Hoving

Division of Emergency Medicine

Stellenbosch University

Co-Investigator: Dr C Hendrikse

Division of Emergency Medicine

University of Cape Town

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Introduction

Background

The pandemic of the novel coronavirus infectious disease (COVID-19), caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), have changed the way of life across the world. As COVID-19 spreads, efforts are being made to reduce transmission via standard public health interventions based on social distancing measures and tracing of contacts.

Social distancing is the practice of increasing the space between people in order to decrease the chance of spreading the infectious disease. Social distancing measures is intended to lessen the acute burden imposed on the healthcare system. In the absence of any measures, there would be a rapid rise in the number of cases that could overwhelm the healthcare system's capacity. On the other hand, if the same number of cases presented over the course of several weeks, it would be more manageable.[1]

It is easy to be overwhelmed by the anticipated harms of COVID-19, but one must remember that other diseases will continue to present during the pandemic.[2] Previous outbreaks have demonstrated that when health systems are overwhelmed, mortality from other treatable conditions can also increase dramatically. During the 2014-2015 Ebola outbreak, the number of deaths caused by measles, malaria, HIV/AIDS, and tuberculosis exceeded deaths from Ebola.[3] The main reason being the reduction in access to healthcare services. It is thus important to balance the demands of responding directly to COVID-19 while maintaining essential health service delivery.[4] The management of emergency health conditions presenting to the emergency centre is such a essential health service, among others.[4]

The indirect impact of COVID-19 as well as the related social distancing measures is still unclear. Globally, non-essential health services like outpatient services, elective surgeries and even certain inpatient services have been scaled down or even suspended.[5] This will surely effect the delivery of acute and chronic elective care. Anecdotal reports are already describing a reduction in the number of patients presenting with acute coronary syndrome (ACS) in both the US and the UK.[6] The lower incidence could be a result of many factors, including symptomatic patients being too afraid to go to hospital, and an increase in short- and long-term mortality is thus expected.[6] Anecdotal evidence from Spain indicates a 57% reduction in diagnostic procedures in cardiac catheterization laboratories and a 40% reduction in percutaneous coronary interventions (PCIs) performed for ST-elevated myocardial infarctions (STEMIs).[6] Contrary, more patients received thrombolysis as ambulance services were overwhelmed or patients tested positive for COVID-19 were not allowed to be transported.[6] This had

led to a substantial increase in non-COVID-19 related mortality compared to the same period the previous year.[6]

The mental health implications of social distancing could also be devastating. Extended time spent alone in isolation is crucial to prevent the spread of COVID-19, but is not ideal for individuals with depression or suicidal thoughts.[7,8] A statistically significant, positive dose-response relationship has also been described between social isolation and all-cause mortality risk.[9]

Motivation

The South African government and health service is gearing towards a massive influx of COVID-19 patients. Strict social distancing measures have been in place since 16 March 2020, including a total 5-week lockdown from 27 March till 30 April. The Minister of Police have already reported a dramatic reduction in serious and violent crimes during the lockdown,[10] with anecdotal evidence from emergency centres reporting a reduction in trauma cases.[11] However, the true impact of the COVID-19 social distancing measures on patients presenting to emergency centres remain unclear. No local data exist regarding patient numbers, type of presentations and mortality in periods before, during and after these measures were implemented or lifted. Hospitals throughout the world are expected to become overwhelmed, and care will be provided at a lower resource level than usual.[12] This will affect both patients with and without COVID-19, and the clinical care of these patients will be a fundamental determinant of the pandemic's overall impact.

Aim

The aim of the study is to describe the effect of the COVID-19 social distancing measures on the workload, case mix and mortality of patients presenting to the emergency centres of two district-level hospitals in Cape Town

The objectives are:

i. To describe and compare the workload, case mix and mortality of patients presenting to the emergency centres of Khayelitsha Hospital and Mitchells Plain Hospital during the time period when COVID-19 social distancing measures were in place to equal time periods before and after the social distancing measures.

ii. To describe and compare the workload, case mix and mortality of patients presenting to the emergency centres of Khayelitsha Hospital and Mitchells Plain Hospital for the time period before, during and after the COVID-19 social distancing measures were in place to equal time periods in two previous years.

Methodology

Study design

A retrospective analysis of prospectively collected observational databases combined with a retrospective chart review to include additional variables.

Study setting

The study will include Khayelitsha Hospital and Mitchells Plain Hospital.

Khayelitsha Hospital is a 300-bed hospital situated in the sprawling township of Khayelitsha, Cape Town. It serves a health district with a population of more than 390 000, which is predominantly Black African (99%) with high levels of unemployment.[13] There is a tremendous burden of disease related to HIV, tuberculosis and interpersonal violence.[14,15] Khayelitsha Hospital provides inpatient services such as surgical, medical, paediatric and obstetrics.[16] It houses a large emergency centre, which is 30% larger than that of a standard district hospital emergency centre.[16] The resuscitation area consists of four beds and a paediatric cot. Each bed is equipped with its own monitor with blood pressure, pulse oximetry, and capnography capabilities. In addition, there is a fully stocked emergency trolley for airway management with a defibrillator and a standalone ventilator for each bed. The admission criteria are either a high acuity score according to the South African Triage Scale or at any senior practitioner's discretion.[17]

Mitchells Plain Hospital is situated about 11 kilometres from Khayelitsha Hospital and about 32 kilometres form Cape Town's city centre. It serves a population of approximately 600 000, which includes the population of Mitchells Plain and the greater part of Philippi, a large nearby township. The demographics of Mitchells Plain comprises of low- to middle-income families of which 90% are coloured,[18] and Philippi which is a low-income community that comprises of 90% black residents.[19] The area battles with social challenges, including gangsterism, crime, drug abuse, unemployment and poverty and interpersonal violence and other injuries are particularly prevalent during weekends.[20] The emergency centre serves 50 000 patients annually, with approximately 60% being of high acuity (orange or red triage according to the South African Triage Scale). The resuscitation area consists out of four beds on the adult side, and a bed and a radiant incubator on the paediatric side. Every resuscitation bed is equipped with its own monitor with the capacity to monitor heart rate, blood pressure, pulse oximetry, and capnography, as well as a defibrillator and a ventilator. Patients are admitted to the resuscitation area based on clinician discretion, as well as a high acuity score according to the South African Triage Scale.[17]

Study population

The electronic Khayelitsha Hospital Emergency Centre database is a prospectively collected observational database capturing all patients managed within the resuscitation area since 1 November 2014. Data are captured electronically, are coded and stored onto a password protected server. A decoding sheet is separately stored. The database is registered at the Stellenbosch University Health Research Ethics Committee (Ref: N15/10/107).

Mitchells Plain utilises an electronic patient tracking and registration database called HECTIS (Hospital and Emergency Centre Tracking Information System) and is currently the official Western Cape Health Department's emergency centre patient tracking software. HECTIS was primarily designed for administrative and management purposes in order to streamline and track patient processes in the emergency centre, including their process times, triage scores, diagnoses and dispositions. Routine clinical data are collected for each patient that enters the emergency centre and HECTIS aims to replace the old paper-based patient register that most emergency centre uses. The data are stored electronically in an Oracle database hosted by the State Information Technology Agency (SITA). The database is situated in a secure access controlled building and is automatically backed up daily. The Master database is hosted at SITA Observatory, while the Disaster Recovery Site is hosted at SITA George. Authorised users can access the data via the HECTIS application. All users login via an active-directory authenticated login and password. Users of the registry are granted access and authorisation according to their clinical role, e.g. a clinician will access a different part of HECTIS than a triage nurse. This registry is in the process of being registered with the University of Cape Town Human Research Ethics Committee (UCT HREC), but has been approved for use in numerous previous studies including UCT HREC 837/2019; UCT HREC 790/2018; UCT HREC 440/2019; UCT HREC 539/2019 and UCT HREC 044/2020.

Sampling

Convenience sampling will be used to include all patients that presented to the emergency centres of Khayelitsha Hospital and Mitchells Plain Hospital over the study period.

The main period of interest will be from 16 March 2020, when the first social distancing measures came into effect, to the date when social distancing will be lifted (yet to be confirmed). Comparative study periods will include the same amount of time directly before and after the period with social distancing measures, as well as the same time periods (before, during and after social distancing measures) for the two previous years i.e. 2018 and 2019.

Data collection and management

Data will be collected by the investigators on site at Khayelitsha Hospital after a decoded extract of the Khayelitsha Hospital Emergency Centre database has been obtained. The Excel spreadsheet will then be further populated through the electronic clinical record.

Data for Mitchells Plain Hospital will be exported from the HECTIS database.

The following variables will be collected at both hospitals:

- Date and time of presentation
- Transport method
- Patient demographics (Age/ Gender)
- Patient co-morbidities
- Presenting complaint
- Patient acuity (according to the South African Triage Scale[17])
- Diagnosis made in the emergency centre
- Time spent in the emergency centre
- Disposition from the emergency centre
- Final hospital diagnosis
- In-hospital mortality

A laptop from the Division of Emergency Medicine at Stellenbosch University (asset nr.471779), with a password protected account, will be used for data capture and storage. Each participant will receive a unique identifying study number and this will be recorded together with the patient's name and hospital folder number in a study log. The study log will be saved in a separate folder. The final dataset will only contain de-identified data and will be password protected. Back-up will occur weekly on an Stellenbosch University server. Upon completion of the study we will ensure that 2 copies of the de-identified dataset are backed-up for long term storage: one on a Stellenbosch University server, and one on an external hard drive that the principal investigator will keep secure within the offices of the Division of Emergency Medicine, Stellenbosch University. Data will be stored for five years after which it will be destroyed.

Statistical analysis

Summary statistics will be used to describe all variables. Categorical data will be summarised using frequency counts, percentages or proportions, and distributions of variables will be presented as two-way tables or bar charts. Medians or means will be used as the measures of central tendency for

continuous responses and standard deviations or quartiles as indicators of spread. Independent proportions will be compared with the t-test or the Mann-Whitney test. The relationship between categorical variables will be determined with the chi-square test or the Fisher's Exact test. The relationships between continuous variables will be analysed using appropriate analysis of variance (ANOVA) tests or the Kruskal-Wallis test if the data do not meet the requirements for a parametric test. A 5% level of confidence will be used to determine significance. Data will be analysed by the principal investigator using SPSS Statistics for Windows, Version 26.0 (IBM Corp. Released 2019. Armonk, NY: IBM Corp.).

A STROBE checklist will be used to structure the final report.

Time schedule

The time schedule will depend on the date when social distancing measures are completely lifted. A provisional time schedule is as follows:

HREC approval	Institutional approval	Data collection	Data analysis	Write up
May 2020	July 2020	August - December 2020	January – February 2021	March – April 2021

Ethical and legal considerations

Risks and benefits: As this study will not involve direct or indirect patient care, risk to patients is likely minimal. Potential risk due to loss of patient data is however possible. For this reason identifiable data will be removed as soon as the data collection for that specific patient is completed. There is no direct benefit to participants; however, having a better idea of the workload and case-mix of patients not directly affected by a pandemic may improve patient-centred outcomes e.g. morbidity and mortality. Staffing adjustments and improving patient flow can be a potential result of identifying temporal workload patterns during a pandemic, as can be the redistribution of resources.

Informed consent process: The databases from which the initial data will be drawn is registered with the Stellenbosch University Health Research Ethics Committee (Ref: N15/10/107) and in the process of being registered with the Human Research Ethics Committee of the University of Cape Town (HECTIS). The information obtained from the database will be supplemented from the electronic patient record; as this will be retrospective, taking individual consent will be impractical. There is no

interest in individual patients, nor individual healthcare personnel. A waiver of informed consent was previously granted to the Khayelitsha Hospital Emergency Centre database, as well as for the HECTIS database at Mitchells Plain Hospital (including UCT HREC 837/2019; UCT HREC 790/2018; UCT HREC 440/2019; UCT HREC 539/2019 and UCT HREC 044/2020). We therefor request a waiver of informed consent.

Privacy and confidentiality: As described earlier, the study will make use of a combination of safeguards to ensure anonymity of study subjects. This will include on-site data management using a Stellenbosch University account and computer, a password protected electronic platform containing the data sample, and coding data immediately after data collection is completed.

Institutional approval for the study will be sought via the National Health Research Database once ethical approval has been obtained.

Limitations

This is a retrospective study using existing databases and therefor has inherent risks of error. Selection bias is primarily a result of either inappropriate inclusion or exclusion of subjects into the database or due to missing data. Inclusion criteria for the Khayelitsha Hospital Emergency Centre database is well defined and should not lead to a significant error.

Missing data allow for selection bias by allowing preference for study subjects with complete data. Patients with missing data will be reported and will not be excluded from analysis; only the incomplete data points will be excluded. Missing patients from the Khayelitsha Hospital Emergency Centre database is also limited since the database manager regularly does quality checks to ensure all patients are captured.

Data entered into the database may also be imprecise or invalid, resulting in information bias. Ideally a portion of the data should be recollected to determine the reproducibility of the study. This will not be possible due to restricted resources, however ongoing quality control performed by the database manager should limit this.

Reporting and implementation of results

Publication as an original article or short report in a peer reviewed journal is anticipated. The study results will also be distributed to the management teams of the emergency centres of Khayelitsha Hospital and Mitchells Plain Hospital. The results will also be distributed to the Disaster Medicine and Special Events section of the Western Cape Department of Health.

Resources

Resources utilisation

Resources used will be mainly non-clinical. This will include use of existing Western Cape Government accounts and computers. As most patient information will be electronically available, hospital clerks will not be utilised to access hard copy folders. The investigators will not conduct the study while on-duty.

Budget

Personnel Compensation		R 0
Principal Investigator	R 0	
Co-Investigators	R 0	
Consulting services		R 0
Statistical services	R 0	
Travel		R 5078
Transport *Rate = R 3.72/km* *Khayelitsha Hospital = R3.72 x 50 (km) x 15 (visits)* *(Return distance between Stellenbosch University & Khayelitsha Hospital = 50km)* *Mitchells Plain Hospital = R3.72 x 41 (km) x 15 (visits)* *(Return distance between Stellenbosch University & Mitchells Plain Hospital = 41km)*	 *R 2790* *R 2288*	
Equipment & Furniture		R 0
Other		R 250
Telephone, cell phone, fax	*R 0*	
Internet & e-mail	*R 250*	
Printing & copying	*R 0*	
Total costs		R 5328

The study will be self-funded.

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Addendum 2: Author Guidelines BMJ Paediatrics open

Available from: https://bmjpaedsopen.bmj.com/pages/authors/

Addendum 3: Health Research Ethics Committee Approval Letters

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Approval Notice

New Application

11/05/2020

Project ID: 15171

HREC Reference No: N20/04/009_COVID-19

Project Title: COVID-19 social distancing measures on district-level emergency centres

Dear Dr. Daniel Van Hoving

The **Response to Stipulations** received on 24/04/2020 08:31 was reviewed by members of **Health Research Ethics Committee** via **Rapid** review procedures on 11/05/2020 and was approved.

Please note the following information about your approved research protocol:

Protocol Approval Date: 24 April 2020

Protocol Expiry Date: 23 April 2021

Please remember to use your Project ID 15171 and Ethics Reference Number N20/04/009_COVID-19 on any documents or correspondence with the HREC concerning your research protocol.

Please note that the HREC has the prerogative and authority to ask further questions, seek additional information, require further modifications, or monitor the conduct of your research and the consent process.

After Ethical Review

Translation of the informed consent document(s) to the language(s) applicable to your study participants should now be submitted to the HREC.

Please note you can submit your progress report through the online ethics application process, available at: Links Application Form Direct Link and the application should be submitted to the HREC before the year has expired. Please see *Forms and Instructions* on our HREC website (www.sun.ac.za/healthresearchethics) for guidance on how to submit a progress report.

The HREC will then consider the continuation of the project for a further year (if necessary). Annually a number of projects may be selected randomly for an external audit.

Provincial and City of Cape Town Approval

Please note that for research at a primary or secondary healthcare facility, permission must still be obtained from the relevant authorities (Western Cape Departement of Health and/or City Health) to conduct the research as stated in the protocol. Please consult the Western Cape Government website for access to the online Health Research Approval Process, see: https://www.westerncape.gov.za/general-publication/health-research-approval-process. Research that will be conducted at any tertiary academic institution requires approval from the relevant hospital manager. Ethics approval is required BEFORE approval can be obtained from these health authorities.

We wish you the best as you conduct your research.

For standard HREC forms and instructions, please visit: Forms and Instructions on our HREC website https://applyethics.sun.ac.za/ProjectView/Index/15171

If you have any questions or need further assistance, please contact the HREC office at 021 938 9677.

Yours sincerely,

Mrs. Brightness Nxumalo
HREC 2 Coordinator

National Health Research Ethics Council (NHREC) Registration Number:

REC-130408-012 (HREC1)•REC-230208-010 (HREC2)

Federal Wide Assurance Number: 00001372
Office of Human Research Protections (OHRP) Institutional Review Board (IRB) Number:

The Health Research Ethics Committee (HREC) complies with the SA National Health Act No. 61 of 2003 as it pertains to health research. The HREC abides by the ethical norms and principles for research, established by the World Medical Association (2013). Declaration of Helsinki: Ethical Principles for Medical Research Involving Human Subjects;the South African Department of Health (2006). Guidelines for Good Practice in the Conduct of Clinical Trials with Human Participants in South Africa (2nd edition); as well as the Department of Health (2015). Ethics in Health Research: Principles, Processes andStructures (2nd edition).

The Health Research Ethics Committee reviews research involving human subjects conducted or supported by the Department of Health and Human Services, or other federal departments or agencies that apply the Federal Policy for the Protection of Human Subjects to such research (United States Code of Federal Regulations Title 45 Part 46); and/or clinical investigations regulated by the Food and Drug Administration (FDA) of the Department of Health and Human Services.

UNIVERSITEIT
STELLENBOSCH
UNIVERSITY

Approval Letter
Amendment

14/10/2020

Project ID: 15171

Ethics Reference No: N20/04/009_COVID-19

Project Title: The effect of the COVID-19 social distancing measures on the workload, case mix and mortality of patients presenting to the emergency centre of two district-level public hospitals in Cape Town

Dear Dr. Daniel Van Hoving

Your amendment request dated 07/10/2020 02:14 refers.

The Health Research Ethics Committee (HREC) reviewed and approved the amended documentation through an expedited review process.

The following amendment was reviewed and approved:

1. Addition of Dr Lembi Magano Akuaake as a co-investigator to this study

Where to submit any documentation

Kindly note that the HREC uses an electronic ethics review management system, *Infonetica*, to manage ethics applications and ethics review process. To submit any documentation to HREC, please click on the following link: https://applyethics.sun.ac.za.

Please remember to use your project ID 15171 and ethics reference number N20/04/009_COVID-19 on any documents or correspondence with the HREC concerning your research protocol.

Yours sincerely,

Mrs. Brightness Nxumalo
Coordinator: Health Research Ethics Committee 2

National Health Research Ethics Council (NHREC) Registration Number:

REC-130408-012 (HREC1)•REC-230208-010 (HREC2)

Federal Wide Assurance Number: 00001372
Office of Human Research Protections (OHRP) Institutional Review Board (IRB) Number:
IRB0005240 (HREC1)•IRB0005239 (HREC2)

The Health Research Ethics Committee (HREC) complies with the SA National Health Act No. 61 of 2003 as it pertains to health research. The HREC abides by the ethical norms and principles for research, established by the *World Medical Association (2013). Declaration of Helsinki: Ethical Principles for Medical Research Involving Human Subjects;the South African Department of Health (2006). Guidelines for Good Practice in the Conduct of Clinical Trials with Human Participants in South Africa (2nd edition)*; *as well as the Department of Health (2015). Ethics in Health Research: Principles, Processes and Structures (2nd edition).*

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